THE ASSISTANT SECRETARY OF THE NAVY
(RESEARCH, DEVELOPMENT AND ACQUISITION)
1000 NAVY PENTAGON
WASHINGTON DC 20350-1000

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MEMORANDUM FOR DISTRIBUTION

SUBJECT: Software Process Improvement Initiative Contract Language

The ASN (RD&A) Software Process Improvement Initiative (SPII) memorandum of May 15, 2006 initiated two quick start projects: software education and software acquisition discipline. The SPII Focus Teams have since identified a key enabler, standardized contract language, to improve our software acquisition discipline. Therefore, I direct that the attached language shall be included in all contracts that contain software development, acquisition and life cycle support, beginning with RFPs issued after January 1, 2007.

Delores M. Etter

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SUBJECT: Software Process Improvement Initiative Contract Language

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Software Process Improvement Contract Language Guidance

This guidance provides language for use in a Request for Proposal (RFP) to provide confidence to the Navy that software integrator and development contractors for Naval software systems have well-documented, standardized software processes as well as continuous software process improvement practices, equivalent to that articulated by CMMI® capability level 3.

Guidance for the Statement of Work, and Sections L and M are provided in this guidance paper. Other areas where language may be needed include:

- Section C – Description/Specification/Work Statement
- Section F – Deliveries or Performance
- Section J – List of Attachments
- Attachments –
  - Contract Data Requirements List (CDRLs)
  - Data Item Descriptions (DIDs)

Statement of Work (SOW)

Within the SOW there shall be a "Technical Approach" section. This section describes the Navy's expectations regarding the technical approach to be taken by the offerors. It is recommended that these expectations be based on the characteristics of the system to be developed and not mandate any specific approach, but rather define the criteria with which proposed approaches will be evaluated. In some cases, however, specific approaches may be required based on Navy needs and the system to be acquired.

Within the "Technical Approach" section, there shall be a subsection titled "Software Engineering Approach", containing at a minimum the following language:

"Software Engineering

The contractor shall define a software development approach appropriate for the computer software effort to be performed under this solicitation. This approach shall be documented in a Software Development Plan (CDRL A00x). The contractor shall follow this SDP for all computer software to be developed or maintained under this effort.

The SDP shall define the offeror's proposed life cycle model and the processes used as a part of that model. In this context, the term "life cycle model" is as defined in IEEE/EIA Std. 12207.0. The SDP shall describe the overall life cycle and shall include primary, supporting, and organizational processes based on the work content of this solicitation. In accordance with the framework defined in IEEE/EIA Std. 12207.0, the SDP shall define the processes, the activities to be performed as a part of the processes, the tasks which support the activities, and the techniques and tools to be used to perform the tasks. Because IEEE/EIA Std. 12207 does not prescribe how to accomplish the task, the offeror must provide this detailed information so the Navy can assess whether the offeror's approach is viable.

The SDP shall contain the information defined by IEEE/EIA Std. 12207.1, section 5.2.1 (generic content) and the Plans or Procedures in Table 1 of IEEE/EIA Std. 12207.1. In all cases, the level of detail shall be sufficient to define all software development processes, activities, and tasks to be conducted. Information provided

must include, as a minimum, specific standards, methods, tools, actions, strategies, and responsibilities associated with development and qualification.

Section L – Instructions, Conditions, and Notices to Offerors

The Navy shall request offerors to submit a draft version of their SDP as a part of their proposal package as well as a rationale for how the Navy justifies their process selection.

"As a part of the proposal, offerors shall submit a draft version of their SDP in accordance with the content defined in the SOW. The SDP may be formatted as desired by the Offeror but must contain the information described by the SDP DID. The SDP is not page limited. An SDP, if it is to-the-point and appropriate, may be preferable to a SDP that is excessively wordy and contains non-essential material."

"Offerors shall also submit, as a part of their proposal, an SDP Rationale which describes why their specific approach is appropriate for the system to be procured and how their proposed processes are equivalent to those articulated by CMMI® capability level 3.

"Offerors shall submit a description of previous experience in developing software of the same nature as this solicitation. As a part of this description, the offerors shall describe the extent to which personnel who contributed to these previous efforts will be supporting this solicitation."

"Offerors shall submit a description of previous experience in developing software using the same or similar processes and approaches as proposed for this solicitation. Offerors shall describe the extent to which personnel who contributed to these previous efforts will be supporting this solicitation. Offerors shall also describe any previous CMMI® or equivalent model-based process maturity appraisals performed. As a part of this description, offerors shall identify the organizational entity and location where the appraisal was performed, the type of evaluation, the organization performing the evaluation, and the level earned."

Section M – Evaluation Factors for Award

At a minimum, the following three evaluation factors relating to the offeror's software development process shall be included in Section M.

"Factor x – Software development approach

Description: The Government will evaluate the offeror's proposed software development approach to ensure it is appropriate for the system to be developed and meets standard levels of completeness and process quality. For this evaluation, the Government will rely primarily on the draft SDP and the SDP Rationale.

Criteria: IEEE/EIA Std. 12207.1, Section 4.2.3, H.3 – Characteristics of Life Cycle Data

Factor x - Software development experience

Description: The Government will evaluate the offeror's previous experience in developing software of the same nature as that being acquired with this solicitation.

Factor x - Software development process experience

Description: The Government will evaluate the offeror's previous experience in developing software using the same or similar approach as proposed for this solicitation. The results of any standard model-based process maturity

appraisals performed within 24 months prior to proposal submission, and the number of proposed staff experienced in using these processes will be part of the evaluation criteria.

CDRLs

The software development process to be used by the winning contractor team is defined in their SDP which shall be designated as a CDRL, with initial delivery after contract award and periodic updates to be delivered subsequent to process improvement reviews. The SDP shall be subject to Government approval.

DIDs

The SDP should be modeled after the IEEE/EIA Std. 12207 standard. The Navy should not specify a specific format but rather allow offerors to select their preferred format for this document. The content of the SDP, however, needs to meet certain criteria. Specifically, the SDP should:

- Document all processes applicable to the system to be acquired, including the Primary, Supporting, and Organizational life cycle processes as defined by IEEE/EIA Std. 12207 as appropriate.
- Contain the content defined by all information items listed in Table 1 of IEEE/EIA Std. 12207.1, as appropriate for the system and be consistent with the processes proposed by the developers. If any information item is not relevant to either the system or to the proposed process, that item need not be required.
- Adhere to the characteristics defined in section 4.2.3 of IEEE/EIA Std. 12207, as appropriate.
- Contain information at a detail sufficient to allow the use of the SDP as the full guidance for the developers. In accordance with section 6.5.3a of IEEE/EIA Std. 12207.1, it should contain, "specific standards, methods, tools, actions, reuse strategy, and responsibility associated with the development and qualification of all requirements, including safety and security."

Background and Justification: Software Process Improvement Contract Language Guidance

Purpose

The purpose of this document is to provide Request for Proposal (RFP) language to facilitate the Navy's ability to select software developers who operate with mature processes and perform continuous process improvement.

The Assistant Secretary of the Navy for Research Development and Acquisition (ASN RD&A) memorandum of 15 May 2006, titled "Software Process Improvement Initiative", established a policy for developing software for Naval software systems. It states that contractors must define and implement process improvements consistent with a minimum capability level of CMMI ® Level 3.

This language shall be used for competitive procurements as well as for sole source procurements. Other RFP/Contract language requirements for other aspects of software development are beyond the scope of the following guidance.

Context

The Navy adopted IEEE/EIA Std. 12207, Standard for Information Technology in May 1998, as its basis for software development planning and acquisition. This standard defines a framework within which specific software development life cycles can be defined and provides a standard set of terminology to be used when describing these activities. This standard does not define any specific approach; it allows a wide variation of system life cycles and facilitating the customization of approaches to accommodate the needs of individual systems.

An overview of IEEE/EIA Std. 12207 is provided in Appendix A.

Strategy

To ensure that the Navy can select software system developers who have well-defined and disciplined processes, it is recommended that offerors responding to RFPs be required to include a draft Software Development Plan (SDP) in their submission. This SDP should describe, in as detailed a manner as possible, the offeror's approach for developing the software and should cover all software development organizations involved in the procurement, including subcontractors, co-contractors, and vendors. The SDP should also describe the offeror's approach to continuous process improvement. The Government will evaluate this SDP as a part of the source selection process to verify the processes are appropriate to the software to be developed, are consistent with best practice, and are equivalent to at least CMMI® capability Level 3.

The Navy also requires offerors to submit, as a part of their proposal package, a rationale that validates the proposed approach in the context of the system to be developed and maps the elements of their approach to the CMMI® framework. This Software Process Rationale will assist in source selection by providing the Government with the reasoning used by the offerors to define the specific processes chosen.

The Navy does not expect the proposed SDP to be complete. The Navy does expect the proposed SDP to contain sufficient information to be able to determine the quality of the planned development approach and its appropriateness to the system to be acquired. Vague and high level SDPs will be deemed as less acceptable, suggesting a lack of a standard corporate process, and an uncertainty regarding the appropriate activities, tasks, and techniques to be applied.

Based on the Navy's evaluation of the proposed SDP and other aspects of the proposal, prior to contract award the Navy may request all offerors to clarify and resubmit their SDPs. After contract award, the SDP becomes a CDRL subject to Government approval. Final delivery of the SDP shall take place as soon after award as feasible, but no later than commencement of software activity.

Because the SDP will serve as the process documentation governing software development, it is important that it contain detail sufficient to provide an objective basis during source selection for assessing the proposed approach, and during development for governing developer activity and monitoring adherence to the plan..

After the SDP CDRL has been submitted and approved, the Navy will use the SDP for monitoring progress and providing indications of emerging risks and problems. As a formal CDRL, the SDP will be placed under configuration control, with all changes subject to Navy approval. The SDP should be reevaluated at least once every six months. This reevaluation should be performed in accordance with the Contractor's continuous process improvement defined within the SDP, and should be conducted to ensure that the applied processes are effective and documented.

The Navy relies on IEEE/EIA Std. 12207 as well as the CMMI ® process improvement model to support the source selection process, since they provide a framework within which the selection can take place.

Appendix A

Overview of IEEE/EIA Std. 12207-1997

IEEE adopted the ISO/IEC standard 12207, an international standard that addresses the acquisition and development of software systems. The Department of Defense transitioned to IEEE/EIA Std. 12207 in 1998. As a part of the Navy's Software Process Improvement Initiative, the Navy is using the standard as a basis for software development, planning and acquisition. This standard consists of three volumes:

IEEE/EIA Std. 12207.0 - Standard for Information Technology – Software life cycle processes

IEEE/EIA Std. 12207.1 - Standard for Information Technology – Software life cycle processes – Life cycle data

IEEE/EIA Std. 12207.2 - Standard for Information Technology – Software life cycle processes – Implementation considerations

Definitions

Life Cycle Model: In the context of the development, operation, and maintenance of a software product, a life cycle model is a defined set of processes, activities, and tasks, and their sequencing and interrelationships, spanning the life of the system from its definition to the termination of its use.

Process: A set of interrelated activities designed to accomplish a specified goal. Table 1 lists all 12207 processes and their associated activities. For example *Development* is a process. Within *Development* there are thirteen activities as shown in Table 1. One of these activities is *Software Coding and Testing* which has five tasks.

Activity – A set of actions which, taken as a whole, transform inputs into outputs.

Tasks: Specific actions performed to accomplish an activity. The way that each task is performed, such as testing, is called the *technique* or *method*.

Method/Technique: The approach used to accomplish the task.

Overview

IEEE/EIA Std. 12207 defines a framework within which specific software development life cycles can be defined and provides a standard set of terminology to be used when describing these activities without any specific life cycle.

In this approach, a life cycle model for a specific development effort is the set of processes, activities, and tasks taken as a whole that result in the production of the intended product. A necessary part of this model is the description of the interrelationships between these elements, including when they occur, and how they depend on each other. IEEE/EIA Std. 12207 provides a set of standard processes and associated activities as shown in the Table 1. It also defines the tasks to be performed in the accomplishment of these activities, but it does not define the way tasks are performed.

For example, IEEE/EIA Std. 12207 defines *Development* as a process. Within *Development*, there are thirteen activities as shown in Table 1. One of these activities is *Software Coding and Testing* which has five tasks: develop the code and tests, perform

testing on the unit, update user documentation, update test requirements and schedule, and evaluate the test results and code according to a set of six criteria defined by the standard.

Example

As an example, consider a project to develop software for a weapons control system. Suppose that the offeror proposes to develop the system in a series of builds. The life cycle model for this project would consist of a description of the number of builds, when they will be developed, and the specific processes, activities, and tasks to be performed to create the builds. Figure 1 illustrates what this model may look like.

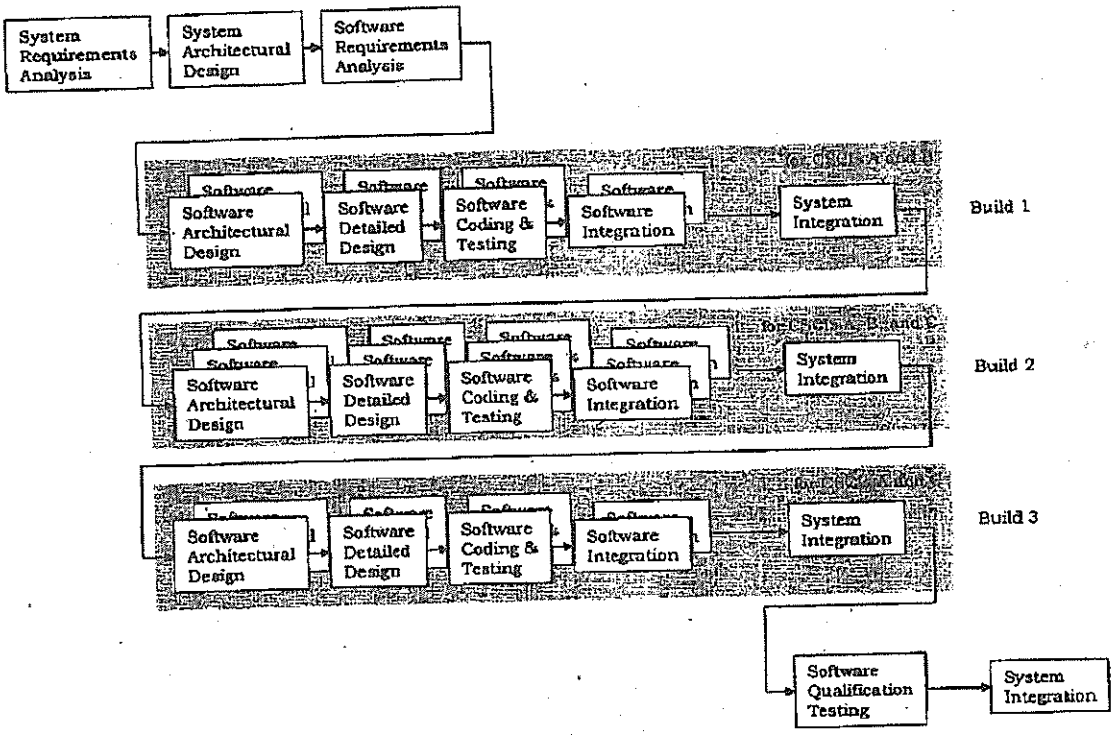

Figure 1. Sample Life Cycle Model

A Software Development Plan (SDP) would consist of a description of the life cycle model chosen, the activities planned, their constituent tasks, and the approach to be used in performing each task. This description would include a schedule for each activity and task to be performed, as well as the criteria to be used to determine whether the task was successful. IEEE/EIA Std. 12207 defines the generic content of such plans, but does not define a specific format.

Table 1. List of IEEE/EIA Std. 12207 Processes and Activities

Process	*Activities*
Acquisition	Initiation Request-for-proposal [-tender] preparation Contract preparation and update Supplier monitoring Acceptance and completion
Supply	Initiation Preparation of response Contract Planning Execution and control Review and evaluation Delivery and completion
Development	Process implementation System requirements analysis System architectural design Software requirements analysis Software architectural design Software detailed design Software coding and testing Software integration Software qualification testing System integration System qualification testing Software installation Software acceptance support
Operation	Process implementation Operational testing System operation User support
Maintenance	Process implementation Problem and modification analysis Modification implementation Maintenance review/acceptance Migration Software retirement